

Large Numbers



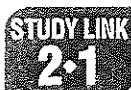
trillions			,	billions			,	millions			,	thousands			,	ones		
100,000,000,000,000	10,000,000,000,000	1,000,000,000,000		100,000,000,000	10,000,000,000	1,000,000,000		100,000,000	10,000,000	1,000,000		100,000	10,000	1,000		100	10	1

- Write the digit in each place of the number 6,812,507,439.
 - millions _____
 - hundred thousands _____
 - ten millions _____
 - billions _____
 - hundred millions _____
 - ten thousands _____
- Write each of the following numbers in standard form.
 - four hundred thirty thousand _____
 - ninety million, one hundred five thousand _____
 - one hundred seventy million, sixty-five _____
 - nine billion, five hundred million,
two hundred forty-three thousand _____
- Write each number in expanded form. **Example:** $235 = (2 * 100) + (3 * 10) + (5 * 1)$
 - 321,000

 - 7,300,000,000,000

 - 2,510,709

- Use extended facts to complete the following.
 - 1 million = $1,000 *$ _____
 - 1 billion = $1,000 *$ _____
 - 1 trillion = $1,000 *$ _____



Large Numbers *continued*



trillion

billion

million

thousand

Because the orbits of the planets are elliptical in shape, the distance between two planets changes over time. The least distances of Mercury, Venus, Saturn, and Neptune from Earth appear in the table at the right. The distances are approximations.

Least Distance from Earth

Planet	Distance (in miles)
Mercury	48,000,000
Venus	25,700,000
Saturn	850,000,000
Neptune	2,680,000,000

5. Write each planet's least distance from Earth in number-and-word notation.

a. Mercury _____

b. Venus _____

c. Saturn _____

d. Neptune _____

6. Write the following numbers in standard notation.

a. 44.3 billion _____

b. 6.5 trillion _____

c. 0.9 million _____

d. 0.7 hundred _____

Practice

Round each number to the given place.

7. 416,254; hundreds

8. 234,989; ten thousands

9. 1,857,000; hundred thousands

10. 6,593,278; millions

STUDY LINK
2-2**Writing Decimals**

1. Build a numeral. Write:
9 in the thousandths place,
4 in the tenths place,
8 in the ones place,
3 in the tens place, and
6 in the hundredths place.

Answer:

2. Build a numeral. Write:
3 in the tenths place,
6 in the ten-thousandths place,
4 in the hundredths place,
0 in the thousandths place, and
1 in the ones place.

Answer:

Write the following numbers in words.

3. 0.8 _____
4. 0.95 _____
5. 0.05 _____
6. 0.067 _____
7. 4.0802 _____

Write a decimal place value in each blank space.

8. Bamboo grows at a rate of about 0.00004, or four _____, kilometer per hour.
9. The average speed that a certain brand of catsup pours from the mouth of the bottle is about 0.003, or three _____, mile per hour.
10. A three-toed sloth moves at a speed of about 0.068 to 0.098, or sixty-eight _____ to ninety-eight _____, mile per hour.

STUDY LINK
2•2
Writing Decimals *continued*


hundreds	tens	ones	and	tenths	hundredths	thousandths	ten-thousandths	hundred-thousandths	millionths
100	10	1	.	0.1	0.01	0.001	0.0001	0.00001	0.000001

Write each of the following numbers in expanded notation.

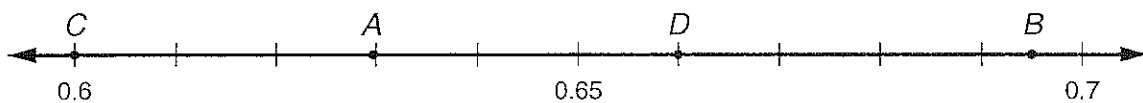
Example: $2.756 = (2 * 1) + (7 * 0.1) + (5 * 0.01) + (6 * 0.001)$

11. 0.013 _____

12. 109.3527 _____

13. Using the digits 0, 3, 6, and 8, write the greatest decimal number possible.

14. Using the digits 0, 3, 6, and 8, write the least decimal number possible.

Try This


Name the point on the number line that represents each of the following numbers.

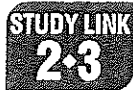
15. 0.66 _____ 16. 0.6299 _____ 17. 0.6 _____ 18. 0.695 _____

19. Refer to the number line above. Round 0.6299 to the nearest hundredth. _____

Practice

20. $0.01 + 0.006 + 0.0008 =$ _____ 21. $0.7 + 0.04 + 0.0002 =$ _____

22. _____ $= 40 + 5 + 0.009$ 23. _____ $= 0.50 + 0.080 + 0.00010$



Sports Records



Solve.



1. The fastest winning time for the New York Marathon (Tesfay Jifar of Ethiopia, 2001) is 2 hours, 7.72 minutes. The second fastest time is 2 hours, 8.017 minutes (Juma Ikangaa of Tanzania, 1989).

How much faster was Jifar's time than Ikangaa's? _____

2. In the 1908 Olympic Games, Erik Lemming of Sweden won the javelin throw with a distance of 54.825 meters. He won again in 1912 with a distance of 60.64 meters.

How much longer was his 1912 throw than his 1908 throw?

3. Driver Buddy Baker (Oldsmobile, 1980) holds the record for the fastest winning speed in the Daytona 500 at 177.602 miles per hour. Bill Elliott (Ford, 1987) has the second fastest speed at 176.263 miles per hour.

How much faster is Baker's speed than Elliott's?

4. The highest scoring World Cup Soccer Final was in 1954. Teams played 26 games and scored 140 goals for an average of 5.38 goals per game. In 1950, teams played 22 games and scored 88 goals for an average of 4 goals per game.

What is the difference between the 1954 and the 1950 average goals per game?

5. $46.09 + 123.047$ Estimate _____ 6. $0.172 + 4.5$ Estimate _____

$46.09 + 123.047 =$ _____ $0.172 + 4.5 =$ _____

Practice

Solve mentally.

7. $\$0.36 + \$0.29 + \$0.64 +$ _____ $= \$2.00$
8. $7.03 +$ _____ $+ 14.05 + 13.07 = 35$
9. $9.225 + 8.5 + 5.775 +$ _____ $= 25$
10. $\$3.69 +$ _____ $+ \$8.31 + \$6.25 = \$25$

STUDY LINK
2.4

Multiplying by Powers of 10



Some Powers of 10

10^4	10^3	10^2	10^1	10^0	.	10^{-1}	10^{-2}	10^{-3}	10^{-4}
$10 * 10 * 10 * 10$	$10 * 10 * 10$	$10 * 10$	10	1	.	$\frac{1}{10}$	$\frac{1}{10} * \frac{1}{10}$	$\frac{1}{10} * \frac{1}{10} * \frac{1}{10}$	$\frac{1}{10} * \frac{1}{10} * \frac{1}{10} * \frac{1}{10}$
10,000	1,000	100	10	1	.	0.1	0.01	0.001	0.0001

Multiply.

1. $4.9 * 0.001 =$ _____

2. _____ $= 7.8 * 0.01$

3. $30 * 10^{-1} =$ _____

4. _____ $= 7 * 10^{-2}$

5. $0.15 * 10^3 =$ _____

6. _____ $= 1.9 * 100$

7. $37.6 * 10^2 =$ _____

8. $42.8 * 10^{-3} =$ _____

9. Mathematician Edward Kasner asked his 9-year-old nephew to invent a name for the number represented by 10^{100} . The boy named it a *googol*. Later, an even larger number was named—a *googolplex*. This number is represented by 10^{googol} , or $10^{10^{100}}$.

a. How many zeros are in the standard form of a googol, or 10^{100} ? _____

b. One googolplex is 1 followed by how many zeros? _____

10. The speed of computer memory and logic chips is measured in nanoseconds. A nanosecond is one-billionth of a second, or 10^{-9} second. Write this number in standard form. _____
11. Light travels about 1 mile in 0.000005 seconds. If a spacecraft could travel at this speed, it would travel almost 10^6 miles in 5 seconds. About how far would this spacecraft travel in 50 seconds? _____ miles

Practice

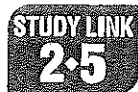
Mentally calculate your change from \$10.

12. Cost: \$4.75; Change: _____

13. Cost: \$3.98; Change: _____

14. Cost: \$0.89; Change: _____

15. Cost: \$8.46; Change: _____



Multiplying Decimals: Part 1



Multiply.

1.
$$\begin{array}{r} 23 \\ * 87 \\ \hline \end{array}$$

2.
$$\begin{array}{r} 56 \\ * 23 \\ \hline \end{array}$$

3.
$$\begin{array}{r} 124 \\ * 96 \\ \hline \end{array}$$



4. Use your answer for Problem 1 to place the decimal point in each product.

a. $2.3 * 8.7 =$ _____

b. $23 * 0.87 =$ _____

c. $2.3 * 87 =$ _____

5. Use your answer for Problem 3 to place the decimal point in each product.

a. $124 * 9.6 =$ _____

b. $1.24 * 9.6 =$ _____

c. $12.4 * 0.96 =$ _____

Two new U.S. nickels were issued in 2004. A likeness of Thomas Jefferson remained on the front of the nickels. The reverse side featured images commemorating either the Louisiana Purchase or the Lewis and Clark expedition.

6. A U.S. nickel is 1.95 mm thick.

a. Estimate the height of a stack of 25 nickels. Estimate _____ mm

b. Calculate the actual height of the stack in mm. _____ mm

c. How much is a stack of 25 nickels worth? _____

Practice

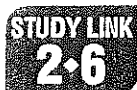
Multiply by 0.10 to find 10% of each number.

7. 10% of \$50.00 = _____

8. 10% of \$110.00 = _____

9. 10% of 345 = _____

10. 10% of 0.70 = _____



Multiplying Decimals: Part 2



Place a decimal point in each problem.

1. $243 * 7.06 = 171.558$

2. $16.4 * 0.7 = 1148$

3. $827 * 9.5 = 7.8565$

4. $7563 * 5.1 = 3,857.13$

Multiply. Show your work on a separate sheet of paper or on the back of this page.

5. _____ = $2.28 * 7.9$

6. _____ = $49.7 * 0.6$

7. _____ = $3.84 * 13$

8. _____ = $0.19 * 53.9$

Solve each problem. Then write a number model.

(Hint: Change fractions to decimals.)

9. Janine rides her bike at an average speed of 11.8 miles per hour. At that speed, about how many miles can she ride in $6\frac{1}{2}$ hours? _____

Number Model _____

10. Kate types at an average rate of 1.25 pages per quarter hour. If she types for $2\frac{3}{4}$ hours, about how many pages can she type? _____

Number Model _____

11. Find the area in square meters of a rectangle with length 1.4 m and width 2.9 m. _____

Number Model _____

Practice

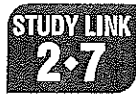
Multiply mentally by 0.10 to find 10%. Then mentally calculate the percent that has been assigned to each number.

12. 20% of \$80.00 = _____

13. 5% of \$220.00 = _____

14. 15% of 640 = _____

15. 30% of 80 = _____



Dividing Numbers



3 Ways to Write a Division Problem

$246 \div 12 \rightarrow 20 \text{ R}6$

$12 \overline{)246} \rightarrow 20 \text{ R}6$

$246 / 12 \rightarrow 20 \text{ R}6$



2 Ways to Express a Remainder

$12 \overline{)246} \rightarrow 20 \text{ R}6$

$12 \overline{)246} = 20\frac{6}{12}, \text{ or } 20\frac{1}{2}$

When estimating quotients, use "close" numbers that are easy to divide.

Example: $346 / 12$ Estimate 35 How I estimated: $350 / 10 = 35$

1. $234 / 6$ Estimate _____ How I estimated: _____

2. $659 / 12$ Estimate _____ How I estimated: _____

3. $512 / 9$ Estimate _____ How I estimated: _____

4. $1,270 / 7$ Estimate _____ How I estimated: _____

5. $728 / 34$ Estimate _____ How I estimated: _____

Solve using a division algorithm. Show your work on a separate sheet of paper or a computation grid.

6. $8 \overline{)534}$ _____

7. $976 / 15$ _____

8. $980 \div 20$ _____

9. $46 \overline{)843}$ _____

10. $6,024 / 38$ _____

11. $5,586 \div 44$ _____

Practice

Multiply mentally.

12. 2 notebooks at \$1.99 each = _____

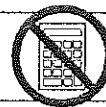
13. 4 pens at \$2.96 each = _____

14. 3 books at \$24.98 each = _____

15. 5 gifts at \$99.99 each = _____

STUDY LINK
2•8

Dividing Decimals



For each problem, follow the steps below. Show your work on a separate sheet of paper or a computation grid.

- ◆ Estimate the quotient. Use numbers that are close to the numbers given and that are easy to divide. Write your estimate. Then write a number sentence to show how you estimated.
- ◆ Ignore any decimal points. Divide as if the numbers were whole numbers.
- ◆ Use your estimate to insert a decimal point in the final answer.

1. $19.76 \div 8$ Estimate _____

How I estimated _____

Answer _____

2. $78.8 \div 4$ Estimate _____

How I estimated _____

Answer _____

3. $85.8 \div 13$ Estimate _____

How I estimated _____

Answer _____

4. $51.8 \div 7$ Estimate _____

How I estimated _____

Answer _____

5. Find $17 \div 6$. Give the answer as a decimal with 2 digits after the decimal point.

6. Five people sent a \$36 arrangement of flowers to a friend. Divide \$36 into 5 equal shares. How much is 1 share, in dollars and cents?

Practice

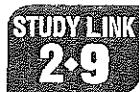
Divide mentally to find the price for 1 pound (lb).

7. \$3.98 for 2 lb = \$_____ per 1 lb

8. \$16.88 for 4 lb = \$_____ per 1 lb

9. \$45.80 for 5 lb = \$_____ per 1 lb

10. \$299.10 for 10 lb = \$_____ per 1 lb



Using Scientific Notation



Write each number in standard notation.

1. $1.24 \times 10^4 =$ _____ 2. $3.5 \times 10^{-3} =$ _____
 3. $8 \times 10^{-6} =$ _____ 4. $7.061 \times 10^8 =$ _____

Change the numbers given in standard notation to scientific notation. Change the numbers given in scientific notation to standard notation.

5. Light travels about 11,802,000,000, or _____, inches per second.
 6. A bacterium can travel across a table at a speed of 1.6×10^{-4} ,
 or _____, km per hour.
 7. One dollar bill has a thickness of 0.0043, or _____, inches.
 8. The mass of 1 million pennies is approximately 2.835×10^6 ,
 or _____, grams.

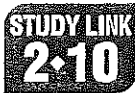
Use $<$, $>$, or $=$ to compare each pair of numbers.

9. 10^{-2} _____ 10^{-3} 10. 1.23×10^{-3} _____ $\frac{1.23}{1,000}$
 11. 9.87×10^5 _____ 1.2×10^6 12. 5.4×10^{-1} _____ 9.6×10^{-4}
 13. Explain how you can tell whether a number written in scientific notation is less than 1.

Practice

Solve mentally.

14. $3,625 + 3,999 =$ _____ 15. $8.7 - 4.99 =$ _____ 16. $4 \times 225 =$ _____
 17. $100,000 / 500 =$ _____ 18. $683 - 298 =$ _____ 19. $387 + 499 =$ _____



Exponential Notation



Use your calculator to write each number in standard notation.



1. $7^2 =$ _____
2. $(0.25)^2 =$ _____
3. $4^3 =$ _____
4. $(0.41)^3 =$ _____
5. $10^{-5} =$ _____
6. $(2.5)^{-3} =$ _____

Use digits to write each number in exponential notation.

7. three to the ninth power _____
8. eight to the seventh power _____
9. eleven to the negative third power _____
10. five-tenths to the negative sixth power _____

Write each number as a product of repeated factors.

Example: $5^3 = 5 * 5 * 5$

11. $(\frac{1}{2})^5 =$ _____
12. $10^{-2} =$ _____
13. $10^{-6} =$ _____

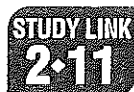
14. You can find the total number of different 4-digit numbers that can be made using the digits 1 through 9 by raising the number of choices for each digit (9) to the number of digits (4), or 9^4 .

Based on this pattern, how many different 5-digit numbers could you make from the digits 1 through 8? _____

Practice

Solve mentally.

15. $15.32 - 1.88 =$ _____
16. $7,200 / 90 =$ _____
17. $4.98 + 3.99 =$ _____
18. $8 * 525 =$ _____



Scientific Notation



Write the following numbers in scientific notation.

1. 0.0036 _____

2. 0.0007 _____

3. 80,000 _____

4. 600 thousand _____

Write the following numbers in standard notation.

5. 5×10^4 _____

6. 4.73×10^9 _____

7. 4.81×10^7 _____

8. 8.04×10^{-2} _____

Write the next two numbers in each pattern.

9. 1×10^{-1} ; 0.1; 1×10^{-2} ; 0.01; _____; _____

10. 0.01, 0.002, 0.0003, _____, _____

Solve the following problems. Write each answer in scientific notation.

11. $(4 \times 10^3) - 10^2 =$ _____

12. $10^3 - (2 \times 10^1) =$ _____

13. $(5 \times 10^{-1}) + 0.02 =$ _____

14. $(7 \times 10^4) - 10^3 =$ _____

15. Use a calculator to complete the table.

Problem	Calculator Display	Scientific Notation	Standard Notation
$5,000,000^2$			
$90^4 - 300^2$			
$20^3 + 30^2$			
$10^4 \times 10^4$			
$5^{20} / 5^{16}$			

Practice

Find the missing digits to complete each number sentence.

16. $\square, \square 63 - 3,9\square 9 = 2,83\square$

17. $71, \square 4\square - 4,8\square 6 = 6\square, 270$

